

APPENDIX A

SPECIAL PROJECT OPERATIONS AND STUDIES

APPENDIX A: BONNEVILLE

Bonneville Dam¹

1. Special Project Operations.

1.1. Spring Creek Hatchery Release. The first hatchery release is expected to occur in early March, followed by special operations for juvenile fish passage as coordinated regionally through TMT. Project operations for fish passage will be defined by RCC teletype prior to the release.

1.2. Spill. Spill will be provided continuously from April 10 through August 31 for spring and summer migrants as required in the NMFS Biological Opinion. These are planning dates and may be modified by TMT or through other regional coordination in 2004.

2. Studies.

2.1. Bonneville Rehab Biological Testing (also testing under the Turbine Survival Program. Main unit 1 will need to be commission tested once it returns to service in May 2004. The unit will undergo a series of pre-startup tests. A normal pre-start scenario is to mechanically roll the unit for 1 day. After the unit has been deemed structurally sound, the unit will be HIPOT tested for 2-3 days. After this test series is complete the unit will be subjected to a minimal run load rejection test. Once test are completed the unit will be then advanced to a 72 hour run test, followed by the 100 day commissioning test. Unit 1 is scheduled to return to normal operation by early June 2004. This commissioning test was coordinated with the FFDRWG group and endorsement was gained to complete the test on February 3, 2004.

2.2. Survival Evaluation. As part of the B2 corner collector evaluation, project and route specific survival, and passage distribution will be estimated for spring and summer migrants. We will evaluate survival of spring chinook salmon and steelhead through (1) the B1 ice and trash sluiceway, (specific gates to be evaluate are 2c, 4c, & 6c in the Spring, and 1c, 3c, & 6c in the Summer), (2) through an MGR turbine unit (MU-4), and from upstream releases through the B2 CC, B2 JBS, spillway, and both powerhouses. We will evaluate survival of fall chinook salmon through the B1 ice and trash sluiceway (specific sluice gates to be evaluated are 1c, 3c, & 6c in the Summer), and with upstream releases through the B2 CC, B2 JBS,

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Spillway and both powerhouses. It is expected that unit 4 that is being used for turbine survival testing will need to be shut down for release pipe/hose installation, and potentially in-season fixes. Due to the potential for changes in operations that could affect presently planned survival research contingency plans are being formulated for discussions with regional fishery managers.

Research at MU-4 MGR likely will occur during the spring passage season only. Unit outages will be required for the installation and removal of monitoring equipment in the sluiceway and MU-4 both Spring and Summer. Further, there will likely be the need for unit outages in order to fix broken or non-functional equipment within the evaluation timeframe (April through July). **Specific project operations required will be maintaining unit 4 as a priority unit for the spring passage season/evaluation.** Powerhouse priority during the MGR testing should keep unit 4 as first on last off with a minimum of unit 2 operating as the same time during testing to maintain good egress conditions of test fish through the test period (April-July 2004).

2.3. Fish Passage Efficiency (FPE) B2 Main Units 11, 12, 17.

FPE research will be conducted at all three structures (First Powerhouse, Second Powerhouse, and Spillway) to evaluate FPE for the spring and summer passage seasons. Primary evaluation techniques will be hydroacoustics and radio telemetry.

Specific project operations and unit priorities could be needed for this study later in the season if units 11, 12 and 17 are not able to continue to be priority B2 units due to reduced flows. Unit outages will be required for the installation and removal of monitoring equipment. Further, unit outages likely will be needed to fix broken or non-functional equipment within the evaluation timeframe (April through July).

2.4. Evaluation of gateway modifications at Bonneville Second Powerhouse. As part of the continuing effort to improve FGE at B2 units the Corps plans to install newly designed VBSSs in unit 17 in FY04. The Corps plans to measure FGE in this modified unit by installing hydroacoustic transducers in all three slots. In addition, main units 11-14 may have extra hydroacoustics installed prior to the fish passage season to strengthen FGE data sets. This will require the units to be shut down to install transducers on STS as well as trashracks prior to the start of the FPP. In-season repairs may also be needed and planned for. Units 17 and 13 will also be monitored for 3 days each in the spring with the aid of the DIDSON camera to measure gap loss. This will require the sampling unit to be shut down during DIDSON frame installation and removal and when the frame is moved between units.

2.5. Prototype Testing of Fish Guidance Efficiency (FGE) Improvements and Unit Gap Loss at Bonneville Second Powerhouse.

In 2004, prototype testing of a newly designed VBS will be conducted with two differing technologies (DIDSON & hydroacoustics). Testing will begin in late April and conclude in late July and will require the test units (15 & 17) to be shut down for short periods for removal and placement of the DIDSON camera frame. The required outage will be for approximately 1-2 hours for each unit per day for two weeks. Additional hydroacoustics transducers have will be installed in units 11, 12, 15, 17 to measure changes in FGE minus Turbine Intake Extensions (TIEs) and the B2CC operating.

Hydroacoustics will be used to estimate FGE (ERDC and PNNL). For the PNNL deployment, transducers will be installed both on the STS and on the trash racks prior to the test start date. Testing will be completed by Mid July. Installation on both the trash racks and STS will require a one-day outage. As always, several outages should be expected throughout the testing season to repair equipment.

It is expected that the test units will be available for normal operation during non-testing periods (unless significant fish injury is seen) to meet project/regional needs.

2.6. Adult Salmon and Steelhead Passage Evaluations. Radio telemetry will be used to monitor adult salmon and steelhead to assess the effect of spill operations and the new corner collector on adult fish passage times and fallback rates. To accomplish these evaluations 650 sp/su Chinook and 350 summer steelhead will be diverted and tagged at the BON AFF and release downstream. Downstream migration of steelhead kelts from fish release at upstream sites will also occur.

2.7. All dates shown are approximate and could be advanced or delayed by a week or so depending on various factors such as river flows, contractor schedules, equipment failures, etc. Some evaluations may not proceed. Therefore, a final description of studies and outages being conducted will be coordinated with the region through AFEP (FFDRWG and SRWG), prior to April 1. All special operation requests or schedule changes will be coordinated with the fisheries agencies and tribes through the AFEP and with RCC and BPA. RCC will coordinate needed changes with the projects and authorize operations in teletype regulations.

3.0. Unit Priorities for spring and summer. Unit priorities will be the same at B2 for the spring and summer in order of first on last off - 11, 17, 12, 13, 18, 14, 15, & 16. These

operations are in support of the FGE and survival tests planned. Unit priorities will differ at B1 from spring and summer. Spring priorities at B1 are 4, 2, 3, 5, 6, 7, 10, 8, & 9. Sluice gates at B1 that will be operational in the spring will be 2c, 4c, & 6c. Summer priorities at B1 are 1, 3, 4, 5, 6, 7, 10, 8, & 9. Sluice gates that will be operational in the summer will be 1c, 3c, & 6c.

APPENDIX A: THE DALLES

The Dalles Dam¹

1. Special Project Operations.

1.1. Spill. Spill will be provided continuously from April 10 through August 31 for spring and summer migrants as required in the NMFS BiOp. These are planning dates and may be modified by TMT or through other regional coordination in 2004. The spillway will be modified during the 2003-'04 winter maintenance period to include a training wall that divides the stilling basin between Bays 6 and 7. A spreadsheet showing new spill patterns has been developed for the modified spillway that will put most of the spill discharge through Bays 1-6.

2. Studies.

Two major research efforts will take place in 2004. The first is a post-construction evaluation of the modified spillway. The second is a forebay behavior study that will provide information on the location and design of a forebay guidance curtain.

2.1. Spillwall Post Construction Evaluation. Survival and injury estimates for spillway passed fish will be generated using balloon tag techniques. Test fish will be passed through bays 2 and 4 and 8 (optional, depending on river flow) via release hoses. Control fish will be released downstream of the end sill via a hose. Two test discharges will be evaluated: one per bay discharge that is between 12 and 18 kcfs, and 21 kcfs. The 21 kcfs treatment may require a forebay restriction at Bonneville, in order to achieve an appropriate tailwater elevation at The Dalles. This will be coordinated with RCC, BPA and regional salmon managers during the study. The balloon-tag study is expected to run from 13 April - 1 May. Each day testing will begin at 0700 hours and conclude around 1900 hours. The balloon-tag study will occur only in the springtime. The start date will be selected prior to the finalization of the FPP. To conduct these evaluations, tailrace BRZ access is required. The hydraulic environment encountered by test fish in the tailrace will be characterized using autonomous sensors released through spillway hoses. Total mortality rates will be estimated using radio telemetry. Radio tagged fish will be released in John Day Dam's tailrace, The Dalles Ice and Trash Sluiceway, and The Dalles tailrace. This

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study element will start in late April and conclude around July 20.

2.2. FPE and Forebay Approach Behavior Evaluation.

Fish passage efficiency will be estimated using fixed hydroacoustic techniques during the spring and summer. Hydroacoustic transducers will be installed in turbine units 1-22 and spillbays 1-10. Also, 3-dimensional approach path and behavior of juvenile salmonids will be described using 3-D acoustic telemetry. Yearling chinook, steelhead, sockeye, and subyearling chinook will be tagged with acoustic tags and released upstream of the project. Approximately 80 hydrophones will be deployed in the forebay to monitor the acoustic-tagged fish as they enter the forebay and pass the dam. Surface hydrophones will be mounted on anchored barges in the forebay and fixed to the dam. Bottom hydrophones will be attached to anchors and deployed in the forebay. All equipment will be deployed in March and early-April and will require appropriate unit outages for dive activities. Studies will begin in mid-April and continue through July.

2.3. Sluice Operations Evaluation. An alternative sluiceway operation will be evaluated in 2004. Fixed hydroacoustics, 3-D acoustic telemetry, and radio telemetry will be used to estimate sluice passage. The schedule (Table 1 and Table 2) will include 2 treatments: operation of gates 1-1, 1-2, 1-3 and operation of gates 1-1, 1-2, 1-3, 18-1, 18-2, and 18-3. Treatments will be switched at 0800 hours daily. Testing will begin April 19 and end on July 17.

2.4. Adult Salmon and Steelhead Passage Evaluations. Radio telemetry will be used to monitor for adult salmon and steelhead to assess the effect of spillway modifications on adult fish passage times and fallback rates. Addition of new antennae just below the North ladder entrance will be accomplished before the end of March.

2.5. Adult White Sturgeon Passage Evaluations. Combined radio and acoustic telemetry will be used to monitor adult white sturgeon in the vicinity of The Dalles Dam. Fish will be captured and tagged by line fishing in the tailrace and forebay areas of the dam and by using fish removed from turbine units during dewatering for maintenance. Placement of underwater hydrophones at sites along the powerhouse and at exit areas above and below the dam will be accomplished in January and February.

Table 1. TDA spring sluice operations(all 3 gates open for MU1 and MU18).

Study Block	Study Day	Summer Date	Day of Week	Sluice Treatment	Study Block	Study Day	Summer Date	Day of Week	Sluice Treatment
1	1	19-Apr	Mon	MU 1	14	27	15-May	Sat	MU 1, MU 18
1	2	20-Apr	Tue	MU 1, MU 18	14	28	16-May	Sun	MU 1
2	3	21-Apr	Wed	MU 1, MU 18	15	29	17-May	Mon	MU 1
2	4	22-Apr	Thur	MU 1	15	30	18-May	Tue	MU 1, MU 18
3	5	23-Apr	Fri	MU 1, MU 18	16	31	19-May	Wed	MU 1, MU 18
3	6	24-Apr	Sat	MU 1	16	32	20-May	Thur	MU 1
4	7	25-Apr	Sun	MU 1, MU 18	17	33	21-May	Fri	MU 1
4	8	26-Apr	Mon	MU 1	17	34	22-May	Sat	MU 1, MU 18
5	9	27-Apr	Tue	MU 1	18	35	23-May	Sun	MU 1, MU 18
5	10	28-Apr	Wed	MU 1, MU 18	18	36	24-May	Mon	MU 1
6	11	29-Apr	Thur	MU 1, MU 18	19	37	25-May	Tue	MU 1, MU 18
6	12	30-Apr	Fri	MU 1	19	38	26-May	Wed	MU 1
7	13	1-May	Sat	MU 1	20	39	27-May	Thur	MU 1, MU 18
7	14	2-May	Sun	MU 1, MU 18	20	40	28-May	Fri	MU 1
8	15	3-May	Mon	MU 1	21	41	29-May	Sat	MU 1
8	16	4-May	Tue	MU 1, MU 18	21	42	30-May	Sun	MU 1, MU 18
9	17	5-May	Wed	MU 1	22	43	31-May	Mon	MU 1
9	18	6-May	Thur	MU 1, MU 18	22	44	1-Jun	Tue	MU 1, MU 18
10	19	7-May	Fri	MU 1	23	45	2-Jun	Wed	MU 1, MU 18
10	20	8-May	Sat	MU 1, MU 18	23	46	3-Jun	Thur	MU 1
11	21	9-May	Sun	MU 1, MU 18	24	47	4-Jun	Fri	MU 1
11	22	10-May	Mon	MU 1	24	48	5-Jun	Sat	MU 1, MU 18
12	23	11-May	Tue	MU 1, MU 18					
12	24	12-May	Wed	MU 1					
13	25	13-May	Thur	MU 1, MU 18					
13	26	14-May	Fri	MU 1					

2.6. Equipment Installation and Maintenance. Installation of hydroacoustic transducers and radio telemetry equipment will begin in January at The Dalles Dam. Installation of hydroacoustic transducers in turbine unit intakes will be performed by divers and thus require appropriate outages of adjacent units. Additionally, limited pre-season inspection of radio telemetry equipment may be necessary during these dives. Dates for these installations and inspections are pending. In-season outages may also be required to repair or replace damaged equipment.

Equipment will be removed in early August with procedures and outages similar to the installation outages discussed above. If removal cannot be accomplished without manipulating the spill schedule, equipment removal will be delayed until after the spill season to prevent interruptions to other ongoing evaluations.

Table 2. TDA summer sluice operations(all 3 gates open for MU1 and MU18).

Study Block	Study Day	Summer Date	Day of Week	Sluice Treatment	Study Block	Study Day	Summer Date	Day of Week	Sluice Treatment
1	1	6-Jun	Sun	MU 1	12	23	28-Jun	Mon	MU 1, MU 18
1	2	7-Jun	Mon	MU 1, MU 18	12	24	29-Jun	Tue	MU 1
2	3	8-Jun	Tue	MU 1, MU 18	13	25	30-Jun	Wed	MU 1, MU 18
2	4	9-Jun	Wed	MU 1	13	26	1-Jul	Thur	MU 1
3	5	10-Jun	Thur	MU 1, MU 18	14	27	2-Jul	Fri	MU 1, MU 18
3	6	11-Jun	Fri	MU 1	14	28	3-Jul	Sat	MU 1
4	7	12-Jun	Sat	MU 1, MU 18	15	29	4-Jul	Sun	MU 1
4	8	13-Jun	Sun	MU 1	15	30	5-Jul	Mon	MU 1, MU 18
5	9	14-Jun	Mon	MU 1	16	31	6-Jul	Tue	MU 1, MU 18
5	10	15-Jun	Tue	MU 1, MU 18	16	32	7-Jul	Wed	MU 1
6	11	16-Jun	Wed	MU 1, MU 18	17	33	8-Jul	Thur	MU 1
6	12	17-Jun	Thur	MU 1	17	34	9-Jul	Fri	MU 1, MU 18
7	13	18-Jun	Fri	MU 1	18	35	10-Jul	Sat	MU 1, MU 18
7	14	19-Jun	Sat	MU 1, MU 18	18	36	11-Jul	Sun	MU 1
8	15	20-Jun	Sun	MU 1	19	37	12-Jul	Mon	MU 1, MU 18
8	16	21-Jun	Mon	MU 1, MU 18	19	38	13-Jul	Tue	MU 1
9	17	22-Jun	Tue	MU 1	20	39	14-Jul	Wed	MU 1, MU 18
9	18	23-Jun	Wed	MU 1, MU 18	20	40	15-Jul	Thur	MU 1
10	19	24-Jun	Thur	MU 1	21	41	16-Jul	Fri	MU 1
10	20	25-Jun	Fri	MU 1, MU 18	21	42	17-Jul	Sat	MU 1, MU 18
11	21	26-Jun	Sat	MU 1, MU 18					
11	22	27-Jun	Sun	MU 1					

2.7. All dates shown are approximate and could be advanced or delayed by a week or so depending on various factors such as river flows, contractor schedules equipment failures, etc. Some evaluations may not proceed. Therefore, a final description of studies and outages being conducted will be coordinated with the region through AFEP (FFDRWG and SRWG) prior to April 1. All special operation requests or schedule changes will be coordinated with the fisheries agencies and tribes through the AFEP and with RCC and BPA. RCC will coordinate needed changes with the projects and authorize operations in teletype regulations.

APPENDIX A: JOHN DAY

John Day Dam¹

1. Special Project Operations.

1.1. Spill. Spill will be provided from April 10 through August 31 for spring and summer migrants as required in the NMFS Biological Opinion. These are planning dates and may be modified by TMT or through other regional coordination in 2004. Between May 15 and July 20, spill will occur from 1900 to 0600 hours (11 hours total). Before that time period, spill will be for 12 hours nightly, from 1800 to 0600 hours. From April 10 to July 20, spill discharges will be 60% of instantaneous project flow at project flows up to 300,000 cfs. Above 300,000 cfs project flow, spill discharges will be 180,000 cfs (up to the hydraulic limit of the powerhouse). From July 21 through August 31, spill will be 30% of instantaneous project flow 24-hours per day. Spill will be provided in a manner consistent with TDG management to avoid excessive gas supersaturation conditions.

2. Studies.

2.1. Modified Extended Length Bar Screen Evaluations (ESBS).

In 2004, ESBS evaluations will focus on the evaluating smolt condition after passage through the modified gatewell. Pending repair of the existing vertical barrier screens, periodic smolt condition tests will be conducted in unit 7 from approximately April 14 to June 20. PIT-tagged fish will be captured at the smolt monitoring facility and examined for descaling and injury.

2.2. Adult Salmon and Steelhead Passage Evaluations.

Downstream migration of post-spawn steelhead (kelts) will be evaluated using PIT tags and radio telemetry at John Day Dam.

2.3. All dates shown are approximate and could be advanced or delayed by a week or so depending on various factors such as river flows, contractor schedules, equipment failures, etc. Some evaluations may not proceed. Therefore, a final description of studies and outages being conducted will be coordinated with the region through AFEP (FFDRWG and SRWG), prior to April 1. All special operation requests or schedule changes will be coordinated with the fisheries agencies and tribes through the AFEP and with RCC and BPA.

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APPENDIX A: MCNARY

McNary Dam¹

1. Special Project Operations.

1.1. Spill. Spill for fish passage will be provided during the spring outmigration season in accordance with spill specifications in the NOAA Fisheries BiOp (Appendix E) as updated in 2004 through the TMT Water Management Plan. Alternative spill patterns to control dissolved gas levels or change fish passage conditions should be coordinated through the FPOM.

1.2. Doble Tests. Two transformer banks and their respective turbine units will be taken out of service for Doble testing and circuit breaker replacement in 2004: T4, units 7 and 8 and T6, units 11 and 12. Sometime between September 1 and December 31 units 1 and 2, and 13 and 14, will also be taken off line for circuit breaker replacement. Each pair of breakers will require a 4-week outage. The exact schedule is yet to be determined.

1.3. Upgrade of Fish Ladder Tilting Weirs. The control and electrical systems for the tilting weir exit section in the Oregon shore fish ladder will be upgraded in 2004. This requires a ladder outage from January 5 to February 2. To ensure that the weirs operate properly after the new systems are installed, the forebay will be briefly fluctuated through its full operating range (335 to 340 feet msl) in March. Similar work was done in the Washington shore ladder in 2003.

1.4. Inspection of Levee System. The Corps will inspect the levee system in the Tri-cities area in 2004, requiring a low McNary pool. Tentative dates for the inspection are May 11 or 12. Further coordination with the RCC, fishery agencies, and others will take place as needed.

1.5. Rehabilitation of Spillway Gates. Four spillway gates will be rehabbed beginning in February 2004. This involves resurfacing wheels, installing low-friction seals, and painting. Work will be completed by April 15, allowing for the use of 22 spillway bays. One or more additional gates may be rehabbed if funding is available.

1.6. Operation of Turbine Units Outside of 1% best Operating Range. An operation of turbine units at McNary Dam outside of the normal 1% best efficiency operating range, up to 115% of

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overload (approximately 80 MWs), is proposed for the spring of 2004. A plan for monitoring this operation is being prepared and coordinated with the region.

2. Studies.

2.1. Evaluation of Juvenile Fish Transportation Versus In-River Survival. Juvenile fish transportation will be evaluated at McNary Dam in 2004. Juvenile spring chinook and steelhead will be PIT tagged at mid-Columbia River hatcheries and either transported by barge or bypassed at McNary Dam. In the spring and early summer, the juvenile bypass facility operations will be alternated between full flow primary bypass and transportation modes by switching the primary bypass gate on an every-other-day schedule. During the transport mode of operation, only designated PIT tagged research fish will be transported while all remaining PIT tagged and run-of-river fish will be bypassed to the river. A potential summer study on fall chinook transportation may be conducted under the routine Bi-Op operations.

2.2. Evaluation of Adult Salmon and Steelhead Migration Past the Snake and Columbia River Dams. The Idaho Cooperative Fisheries Research Unit will continue to monitor the passage of adult salmonids through the hydrosystem. The study requires the installation of radio receivers and data loggers throughout the fishways and at various locations on the dam. The installation of equipment will take place prior to the fish season and is not anticipated to require special project operations.

2.3. McNary Turbine Upgrade Study. Studies related to upgrading the turbine units at McNary Dam will continue in 2004. Prototype VBSs will be evaluated in the A-slot gatewells of turbine units 2, 3, and 4. The VBSs will include a traveling VBS and 2 variations of bar screen VBSs. Testing will include a hydroacoustic evaluation of fish guidance efficiency of all turbine intake slots of the 3 test units at high and low turbine operations. PIT tagged fish will be released in the A-slot gatewells of the 3 test units, along with the A-slots of turbine units 5 and 9, equipped with standard VBSs. PIT tagged fish will be released during the spring and summer on days when the transportation facilities are operating in collection mode so test fish can be collected and evaluated for fish condition. Radar sensors will also be installed in all gatewells of the 3 test units for measuring water surface elevations in the bulkhead and operating gate slots.

2.4. Survival Studies. Survival studies will be conducted at McNary Dam in both spring and summer. Juvenile fish will be

radio tagged, released upstream of the project, and monitored as they pass the project. The study is designed to determine overall project survival, spillway survival, bypass survival, and overall powerhouse (bypass and turbine together) survival. These tests will not require any special operations.

APPENDIX A: ICE HARBOR

Ice Harbor Dam¹

1. Special Project Operations.

1.1. Spill. Spill for fish passage will be provided during the spring and summer outmigration seasons in accordance with spill specifications in the NOAA Fisheries BiOp (Appendix E) as updated in 2004 through the TMT Water Management Plan. Alternative spill patterns to control dissolved gas levels or change fish passage conditions should be coordinated through the FPOM.

1.2. Doble Tests. To complete Doble testing in 2004, line 1 and turbine units 1 and 2 will be taken out of service from September 8 to 9.

1.3. AWS Pump Maintenance (North Shore). The three new AWS pumps installed in early 2003 were found to have various problems associated with the gearboxes (vibration, oil contamination, defective oil seals and bearings). To fix the problems one pump at a time will be taken out of service for one month from December 2003 to February 2004, and for shorter periods in (tentatively) November and December 2004. Two pumps will remain on line except during the two-week ladder outage in the January-February time frame.

1.4. AWS Pump and Mud Valve Maintenance (South Shore). Two of the eight AWS pumps for the south shore ladder will have their butterfly valves rehabbed, and mud valves in the fish pumps and collection channel will be repaired. All pumps will be out of service from January 2 to February 26, at which time six pumps will resume operation. All eight pumps will be operating by March 31.

1.5. Testing of Spillway Gates. Trunnion friction will be evaluated on two spillway gates during the June-August time frame. Stop logs will be installed upstream from the test gate and, for safety purposes, both adjacent spillway gates will be closed and tagged out. After mounting strain gauges, the test gate will be briefly opened to three stops and then closed (a dry test). Stop logs will be in place for about three or four days. A similar wet test will follow. Further coordination with the fishery agencies and others will take place as needed.

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1.6. Inspection for Shoreline Erosion. The Corps will inspect for shoreline erosion throughout the Ice Harbor Project in 2004, requiring a low Ice Harbor pool. The tentative date for the inspection is April 6. Further coordination with the RCC, fishery agencies, and others will take place as needed.

1.7. Test of Spillway Emergency Generators. The Corps will test the spillway emergency generators by briefly opening the spillway gates about one stop, as many at one time as possible. The test will take place on April 6, or up to 30 days before that. Further coordination with the RCC, fishery agencies, and others will take place as needed.

1.8. Survey of Spillway Stilling Basin. The Corps plans to survey the spillway stilling basin at Ice Harbor in September 2004. This involves hydroacoustic sounding from a boat over a one or two day period. Relatively still water is needed for the work and it may be necessary to change turbine unit or fish passage operations. The purpose is to detect erosion damage caused by spill. Further coordination with the RCC, fishery agencies, and others will take place as needed.

2. Studies.

2.1. Spillway Survival Study. Radio telemetry, PIT, and balloon tag studies will estimate the survival rates of test fish passing over the spillway. Project operations (spill levels and possibly patterns) will change according to a randomized block schedule. Details of the schedule and operations are not available at this time, but will be developed through the SRWG and FFDRWG. Spill operation will involve two distinct operations including one "bulk" spill pattern and one small gate opening pattern. Specifics will be coordinated with the fishery agencies and others as needed.

2.2. Prototype Separator Evaluation. Separation efficiencies will be evaluated for different densities of juvenile fish passing through the prototype separator. This will be conducted using run of river fish at Ice Harbor and with fish collected from the gatewells at Lower Granite. Fish from Lower Granite will be transported by truck, and held at Ice Harbor for release into the collection channel. This study will require operation of the switch gate to the prototype separator during the test periods. A schedule of operation will be provided prior to the field season.

2.3. Evaluation of Adult Salmon and Steelhead Migration Past the Snake and Columbia River Dams. The Idaho Cooperative Fisheries Research Unit will continue to monitor the passage of adult

salmonids through the hydrosystem. The study requires the installation of radio receivers and data loggers throughout the fishway and at various locations on the dam. The installation of equipment will take place prior to the fish passage season and is not anticipated to require special project operations. As part of this study, the fish trap in the south ladder will be operated from late June through late October. Trapping and tagging would occur four mornings per week and be completed by noon each day.

2.4. Adult Fishway Evaluation. The Walla Walla District will evaluate operational characteristics of the adult fishways in 2004. The purpose is to analyze existing operating conditions and investigate alternatives to improve fish passage, especially during times of low tailwater. This will involve adjusting diffuser gates and entrance weirs. Efforts will be made to stay within criteria, although occasional deviations will likely occur.

APPENDIX A: LOWER MONUMENTAL

Lower Monumental Dam¹

1. Special Project Operations.

1.1. Spill. Spill for fish passage will be provided during the spring outmigration season in accordance with spill specifications in the NOAA Fisheries BiOp (Appendix E) as updated in 2004 through the TMT Water Management Plan. Alternative spill patterns to control dissolved gas levels or change fish passage conditions should be coordinated through the FPOM (but see 1.2. below). During periods of high river flow, spill volumes and the elevation of Lower Monumental reservoir may need to be manipulated on a daily or every-other-day basis to provide safe conditions for loading the fish barge at the juvenile fish facility below the dam.

1.2. Spill Patterns. New spillway deflectors for bays 1 and 8 were constructed in late 2002 and early 2003. As a result, new spill patterns were implemented in 2003 (see Table LMN-9 in the 2003 FPP). However, it was determined that opening bays 1 and 8 beyond three stops resulted in fish being ejected from the river. A temporary restriction was then placed on the two bays, requiring that they be operated at three stops or less and the remaining stops be distributed among the other six spillway bays. This restriction will continue through 2004 (see Table LMN-9 in this 2004 FPP). Parapet walls for keeping fish in the river are scheduled to be constructed before the 2005 migration season, at which time the restriction can be lifted.

1.3. Rehabilitation of AWS Pump. AWS pump 1 will be rehabbed (turbine, gearbox, and the pump itself). This requires an extended outage for that pump from December 15, 2003 to February 28, 2004. Pumps 2 and 3 will be out of service briefly beginning December 15 to allow for the installation of bulkheads in pump 1, and will be returned to service through December 31. Pumps 2 and 3 will then need routine maintenance, requiring concurrent outages for most of January.

1.4. Survey of Spillway Stilling Basin. The Corps plans to survey the spillway stilling basin at Lower Monumental in July or August 2004. This involves hydroacoustic sounding from a boat over a one or two day period. Relatively still water is needed for the work and it may be necessary to change turbine unit or fish passage operations. The purpose is to detect erosion damage

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caused by spill. Further coordination with the RCC, fishery agencies, and others will take place as needed.

1.5. Doble Tests. Transformer banks T1 and T2 will be Doble tested in 2004. This will involve all generation of all six units. The plant will be off line from 0600-1700 hours each day from August 30 - September 3.

2. Studies.

2.1. Lower Monumental Spillway Survival Study. Survival studies will be conducted using radio-telemetry in 2004. Two spill patterns will be tested in a 2-day blocked design. The two patterns will be determined through discussions within the region and physical model testing at ERDC in Mississippi.

2.2. Ice Harbor Spillway Survival Study. Juvenile fish will be removed from the Lower Monumental Dam daily sample and tagged with radio tags and PIT tags for a spillway survival study at Ice Harbor Dam.

2.3. Near-field Study of Total Dissolved Gas Exchange and Evaluation of Added Spillway Deflector Performance. As part of the COE Fastrack Gas Abatement Program, total dissolved gas abatement alternatives are being developed to reduce the TDG exchange associated with spill operations and to provide greater flexibility in scheduling spillway operations. Additional spillway deflectors for bays 1 and 8 were constructed in late 2002 and early 2003, and now all spillway bays are so equipped. A field study is proposed to address the TDG exchange associated with the modified spillway and associated operations under a wide range of operating conditions. The proposed long-term monitoring program will be initiated in April 2004 prior to the spill season and continue through the end of spill, typically in June.

This three month sampling period will provide for the widest range of operating and environmental conditions. This study will primarily focus on determining the total dissolved gas exchange characteristics associated with spillway operation for discharges up to the design spill for a 7-day, 10-year frequency flood. The incorporation of specific operations could significantly enhance study findings. These special operations could include scheduled spill outage to maintain TDG instruments, alternative spill patterns including bulk spill, management of tailwater stage through storage in Lake Sacagawea, and constant spill with and without powerhouse flows. Circulation patterns below the dam will also be described through a variety of sampling devices. This information will support the interpretation of study TDG

data and related issues concerning fish passage through this river reach.

2.4. Evaluation of Adult Salmon and Steelhead Migration Past the Snake and Columbia River Dams. The Idaho Cooperative Fisheries Research Unit will continue to monitor the passage of adult salmonids through the hydrosystem. Installation of radio receivers and data loggers throughout the fishway and various locations on the dam will be required. The installation of equipment will take place prior to the fish passage season and is not anticipated to require special project operations.

2.5. Adult Fishway Evaluation. The Walla Walla District will evaluate operational characteristics of the adult fishway in 2004. The purpose is to analyze existing operating conditions and investigate alternatives to improve fish passage. This will involve adjusting diffuser gates and entrance weirs. Efforts will be made to stay within criteria, although occasional deviations will likely occur.

APPENDIX A: LITTLE GOOSE

Little Goose Dam¹

1. Special Project Operations.

1.1. Spill. Spill for fish passage will be provided during the spring outmigration season in accordance with spill specifications in the NOAA Fisheries BiOp (Appendix E) as updated in 2004 through the TMT Water Management Plan. Alternative spill patterns to control dissolved gas levels or change fish passage conditions should be coordinated through the FPOM.

1.2. Testing of Spillway Gates. Trunnion friction will be evaluated on two spillway gates during the June-August time frame. Stop logs will be installed upstream from the test gate and, for safety purposes, both adjacent spillway gates will be closed and tagged out. After mounting strain gauges, the test gate will be briefly opened to three stops and then closed (a dry test). Stop logs will be in place for about three or four days. A similar wet test will follow. Further coordination with the fishery agencies and others will take place as needed.

1.3. Survey of Spillway Stilling Basin. The Corps plans to survey the spillway stilling basin at Little Goose in July or August 2004. This involves hydroacoustic sounding from a boat over a one or two day period. Relatively still water is needed for the work and it may be necessary to change turbine unit or fish passage operations. The purpose is to detect erosion damage caused by spill. Further coordination with the RCC, fishery agencies, and others will take place as needed.

2. Studies.

2.1. Evaluation of Adult Salmon and Steelhead Migration Past the Snake and Columbia River Dams. The Idaho Cooperative Fisheries Research Unit will continue to monitor the passage of adult salmonids through the hydrosystem. Installation of radio receivers and data loggers throughout the fishway and various locations on the dam will be required. The installation of equipment will take place prior to the fish season and are not anticipated to require special project operations.

2.2. Adult Fishway Evaluation. The Walla Walla District will evaluate operational characteristics of the adult fishway in 2004. The purpose is to analyze existing operating conditions

¹ The purpose of this section is to notify regional interests of planned activities that will or may affect fish passage. Further coordination may occur as needed.

and investigate alternatives to improve fish passage, especially during times of low tailwater. This will involve adjusting diffuser gates and entrance weirs. Efforts will be made to stay within criteria, although occasional deviations will likely occur.

APPENDIX A: LOWER GRANITE

Lower Granite Dam¹

1. Special Project Operations.

1.1. Spill. Spill for fish passage will be provided during the spring outmigration season in accordance with spill specifications in the NOAA Fisheries BiOp (Appendix E) as updated in 2004 through the TMT Water Management Plan. Alternative spill patterns to control dissolved gas levels or change fish passage conditions should be coordinated through the FPOM. During periods of high river flow, spill volumes and the elevation of Lower Granite reservoir may need to be manipulated on a daily or every-other-day basis to provide safe conditions for loading the fish barge at the juvenile fish facility below the dam.

1.2. Index Testing. Index testing of two turbine units will take place in 2004. Unit 2 will be tested from March 15 to 26, and unit 4 from (tentatively) December 6 to 17. Units 1 to 3 are in one "family", and units 4 to 6 in another. The purpose of the index testing is to determine turbine unit performance so that the unit can be operated at peak efficiency.

1.3. Repair of Turbine Unit 1. Turbine unit 1 has been out of service since December 2002. Repair work, including generator rewind and cavitation repair, is scheduled for completion by May 2004.

1.4. Testing of Spillway Gates. Trunnion friction will be evaluated on two spillway gates during the June-August time frame. Stop logs will be installed upstream from the test gate and, for safety purposes, both adjacent spillway gates will be closed and tagged out. After mounting strain gauges, the test gate will be briefly opened to three stops and then closed (a dry test). Stop logs will be in place for about three or four days. A similar wet test will follow. Further coordination with the fishery agencies and others will take place as needed.

1.5. Survey of Spillway Stilling Basin. The Corps plans to survey the spillway stilling basin at Lower Granite in July or August 2004. This involves hydroacoustic sounding from a boat over a one or two day period. Relatively still water is needed for the work and it may be necessary to change turbine unit or fish passage operations. The purpose is to detect erosion damage

¹ The purpose of this section is to notify regional interests of planned activities that will or may affect fish passage. Further coordination may occur as needed.

caused by spill. Further coordination with the RCC, fishery agencies, and others will take place as needed.

1.6. Relocation of Behavioral Guidance Structure (BGS). The attachment point of the BGS to the dam will be moved from between units 3 and 4 to between units 5 and 6. The depth of the BGS will also be reduced near the dam. Currently, the structure is about 80 feet deep near the dam, tapering to about 55 feet deep at the upstream end. Part of the bottom of several of the sections will be removed, so the maximum depth at any point of the structure will be about 60 feet. This work is anticipated to take about six weeks and will likely take place in February and March. Preliminary unit outage schedules call for units 2, 3 and 4 to be out of service for approximately one week in early February and units 4, 5 and 6 to be out of service for approximately two weeks in mid and late February.

2. Studies.

2.1. Evaluation of Adult Salmon and Steelhead Migration Past the Snake and Columbia River Dams. The Idaho Cooperative Fisheries Research Unit will continue to monitor the passage of adult salmonids through the hydrosystem. The study requires the installation of radio receivers and data loggers throughout the fishway and at various locations on the dam. The installation of equipment will take place prior to the fish passage season and is not anticipated to require special project operations. As part of this study, the fish trap in the ladder will be operated from early July through late October to recapture fish outfitted with DST tags at the Ice Harbor trap.

2.2. Removable Spillway Weir Operation. The Removable Spillway Weir (RSW) was installed in the summer of 2001. It underwent extensive biological testing in spring 2002 and 2003. During February and March 2004, the Behavioral Guidance Structure will be moved to the north two units and the depth decreased along part of its length. The 2004 biological test will likely take place between mid-April and early June. The expected forebay elevation during testing will be between 734 and 735 feet, providing approximately 6,700 to 7,700 cfs over the RSW. A specific study design has not been finalized at this time, but will likely involve 24 hour per day operation of the RSW, along with some level of "training spill". Monitoring will likely consist of radio-telemetry. Monitoring will focus on RSW efficiency and effectiveness, and fish behavior in the vicinity of the RSW and relocated BGS. The evaluation may involve periodic removal of the BGS, which would likely result in short-term (1 - 3 hours) outages at units 5 and 6. A summer test of the RSW and BGS may also take place in 2004. This would occur sometime between mid-June and late July and would most likely run

for 3 or 4 weeks. Radio-telemetry would again be used to assess RSW performance. Project operations would most likely include the RSW (between 6,000 and 7,700 cfs) and some level of training spill, 24 hours per day.

2.3. Prototype Separator Evaluation. Separation efficiencies will be evaluated for different densities of juvenile fish passing through the prototype separator located at Ice Harbor. This will be conducted using run of river fish at Ice Harbor and with fish collected from the gatewells at Lower Granite. Fish from Lower Granite will be transported by truck, and held at Ice Harbor for release into the collection channel. This study will require operation of the switch gate to the prototype separator during the test periods. A schedule of operation will be provided prior to the field season.

2.4. Adult Fishway Evaluation. The Walla Walla District will evaluate operational characteristics of the adult fishway in 2004. The purpose is to analyze existing operating conditions and investigate alternatives to improve fish passage, especially during times of low tailwater. This will involve adjusting diffuser gates and entrance weirs. Efforts will be made to stay within criteria, although occasional deviations will likely occur.

2.5. Evaluation of Juvenile Fish Transportation Versus In-River Survival. Juvenile spring/summer chinook and steelhead will be PIT tagged at the juvenile fish facility and then released into the river below the project for either in-river migration or collection and transportation at Little Goose Dam. Most fish will be tagged out of the east bank of raceways in NOAA Fisheries' temporary tagging facilities. Tagging of fish from the raceways will be independent of any other facility sampling operations and will reduce the number of fish direct loaded into fish barges. At the beginning and end of the tagging operation, when fish numbers are low, fish may be tagged in the facility sampling room. This will require an increase in the normal facility sampling rate in order to get the required number of fish on marking days. The adult fish trap will also be operated in 2004 to monitor adult returns of study fish tagged in previous years.